University of Nottingham
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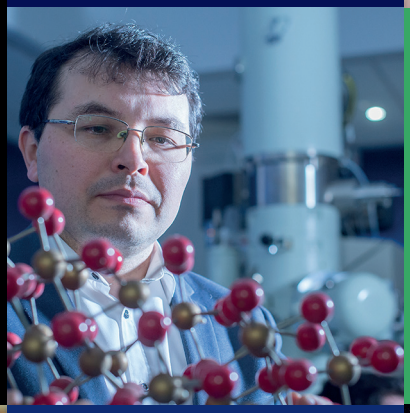
MSc Gravity, Particles and Fields

Gain expertise in a specific topic at the frontier of current research

nottingham.ac.uk/mathematics/masters

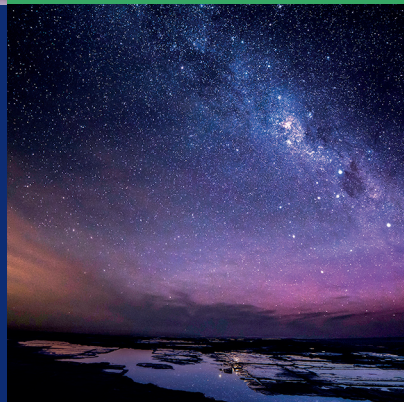
Develops advanced methods in mathematics and physics



Undertake an independent research project

Benefit from expert teaching at a research-led university

Provides solid basis for a research career



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Develop advanced methods in mathematics and physics required for many scientific careers

Overview

The course provides an introduction to the physical principles and mathematical techniques of current research in general relativity, quantum gravity, particle physics, quantum field theory, quantum information theory, cosmology and the early universe. The course is taught jointly by the School of Mathematical Sciences and the School of Physics and Astronomy. The MSc offers enhanced employment opportunities compared with undergraduate degrees, and in particular it offers training appropriate for students preparing to study for a PhD.

Content

Ranked within the top 10 nationally for research power and research quality, the School is one of the largest and strongest mathematics departments in the UK (Research Excellence Framework, 2014).

During this course you will:

- study introductory material on general relativity and its mathematical language of differential geometry
- participate in exploratory study of black holes, cosmology and aspects of general relativity related to string theory
- develop a deeper understanding of quantum mechanics and special relativity
- engage with professional and research literature

Structure

Modules are mainly delivered via lectures and/or problem classes and take place on University Park Campus, during the autumn and spring semesters of the academic year. There is a year-long introduction to quantum field theory which introduces the famous Feynman diagrams of particle physics in a systematic way, and studies aspects of modern particle physics. There is also an introduction to the concepts of quantum information theory.

Typical modules include:

- Advanced Gravity (10 credits)
- Black Holes (20 credits)
- Differential Geometry (20 credits)
- Gravity (10 credits)
- Introduction to Quantum Information Science (20 credits)
- Modern Cosmology (20 credits)
- Quantum Field Theory (20 credits)

Dissertation

The dissertation is worth 60 credits and is carried out during the summer. You will concentrate on an independent research project, and on writing a substantial dissertation. The study will be largely self-directed, with oversight and input provided where necessary by a supervisor from the School of Mathematical Sciences or the School of Physics and Astronomy.

Past projects include:

- Extra Dimensions
- Gravity in Torsion
- How often does an accelerated particle detector click in 1+1 spacetime dimensions?

Entry requirements

At least a second class honours (2:1) BSc degree (or equivalent) in physics, mathematical physics, mathematics, or joint degrees containing substantial elements of physics or mathematics. Previous knowledge of mechanics, quantum mechanics, special relativity and methods of mathematical physics (all as taught typically at BSc level two) is also required.

Funding your studies

When looking at how to fund your postgraduate studies, it's worth taking the time to research your options, as funding is available from a variety of sources.

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